

## Designation of lectotypes for *Microchaetus microchaetus* (Rapp, 1849) and *Microchaetus rappi* Beddard, 1886, and historical perspectives on these species (Oligochaeta: Microchaetidae)

by

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### ABSTRACT

*Microchaetus microchaetus* (Rapp, 1849) is redescribed, a lectotype designated and type depository indicated. *M. rappi* Beddard, 1886, is reassessed and determined to be a valid species, and its lectotype is designated. Historical perspective and synonymy for both species are provided. The gigantic species – *M. braunsi* Michaelsen, 1899, *M. decipiens* Michaelsen, 1899, *M. klopperi* Plisko, 1991, *M. microchaetus* (Rapp, 1849), *M. rappi* Beddard, 1886 and *M. stuckenbergi* Plisko, 1991, constitute a natural group within the genus *Microchaetus*, apparently confined to the Eastern Cape Province.

### INTRODUCTION

Since the original description of *Microchaetus microchaetus* (Rapp, 1849), few attempts to locate the type material were made, and the type depository was declared as unknown (Reynolds 1976; Plisko 1991 1992). While working on the Oligochaeta material in the Natural History Museum in Vienna in 1994, I had an opportunity to verify the identity of the type specimen of *M. microchaetus*, which had been labelled by D. Rosa under the name *Microchaeta rappi* Beddard, 1886. Discovery of this led me to a comparative study of material of *M. rappi* housed in The Natural History Museum in London. This resulted in the redescription of *microchaetus* and the resurrection of *rappi* from synonymy, after a long history of confusion over these two species.

The objectives of this paper are as follows: to establish the identity of *M. microchaetus* (Rapp, 1849), and *M. rappi* Beddard, 1886, as separate species, with brief accounts of their distinguishing features; to record the depositories and collecting data of their respective type specimens; to designate a lectotype for each species; and to validate *M. microchaetus* (Rapp, 1849) as the type species of the genus *Microchaetus* Rapp, 1849. The resurrection of *M. rappi* Beddard, 1886, from synonymy clarifies synonymic lists for both species, and some historical data can be added.

### ABBREVIATIONS

BMNH	The Natural History Museum, London, U. K.
Cap d. Gut. Hoffnung	German name for Cape of Good Hope
JDP	J. D. Plisko
Leuc.	Leuckart, F. S.
<i>Musei Vindobonensis</i>	Latin name for the Natural History Museum in Vienna

NHM  
'vom Cap'

Natural History Museum in Vienna  
German, from the Cape Province

#### HISTORICAL DATA

In 1849, W. Rapp reported from South Africa a very large earthworm, which he named *Lumbricus microchaetus*. The distinctive specific characters, especially its comparatively small setae related to the large size of the worm, suggested the species name, but also aroused objections to its inclusion in *Lumbricus*. Comparing characters of the other genera known at that time, in the last paragraph of his paper, Rapp wrote: '...so konnte auch für diesen Wurm ein besonderes Genus gebildet werden, unter dem Namen *Microchaetus*'. No type locality and no information on the depository of the specimen were provided, as Rapp merely stated 'vom Cap'. That limited description with only a few characters, and unavailability of the original material, encouraged Beddard to acquire new earthworm material from the southern part of Africa, at that time known as the Cape Colony. In his paper, Beddard (1884) explained: '...Forty years ago Rapp described and figured an earthworm six feet two inches in length, which was obtained from the neighbourhood of Port Elizabeth ... Being anxious to secure a specimen for dissection I applied to the Rev. G. R. Fisk, who most kindly secured and sent to me a fine living one...'. It is not clear from where at that time the information on the site 'Port Elizabeth' was taken, because in the letter posted to G. R. Fisk it is only stated '... there is an earthworm found in your part of the world that is said to be six feet long ...' (Anon. 1884). In his following paper, Beddard (1886a) repeated that he had requested from G. R. Fisk new material of giant earthworms and confirmed receiving a few large specimens. He also quoted the contents of a letter from Fisk, and speculated that the specimens were collected from the area of Port Elizabeth. After dissection and careful study of these specimens (with clitellum on segments 10–30), Beddard erected for them the new species *Microchaeta rappi* Beddard, 1886. He considered that the specimen previously described by Rapp should also be recorded under this new name. In the same paper, Beddard (1886a) accepted the generic name proposed by Rapp and provided an extended description of the genus *Microchaetus*.

Benham (1886a), accepting the name proposed by Beddard as valid for the species described by Rapp, relegated the original name *microchaetus* to synonymy of *rappi*. Having other material from Port Elizabeth (specimens of *microchaetus* with clitellum on segments 13–28), Benham (1886b) provided a comprehensive description of it as *Microchaeta rappi* Beddard, 1886, despite differences in the position of clitellum, tubercula pubertatis and number of spermathecae. The same error was made by Beddard (1895) in his monograph, when the differences between species described by himself and Benham (1886a,b) were ignored, and the position of the clitellum on 10–25 was indicated. Because of these inaccuracies, both authors created the misleading interpretation that all material studied by them belonged to only one species. Consequently, most of the discussions that followed in the literature were centred on priority of the names, species synonymy, or generic affiliation.

It is not certain if Perrier (1881) and Vaillant (1889) saw the type material of *microchaetus* when commenting on the generic relationships of the species, and on

the acceptability of the generic name *Microchaetus* as suggested by Rapp. In Vaillant's (1889) opinion, *M. rappi* Beddard, 1886, was a synonym of *Microchaetus microchaetus* (Rapp, 1849). He also concluded that if the name *Microchaetus* was not acceptable, then a new genus for *microchaetus* should be created called *Rappia*, or possibly the species should be placed in *Antaeus* Vaillant, 1889. However, no transfer to any of these genera followed.

Rosa, while working on the earthworm collection of the Natural History Museum in Vienna, saw Rapp's original material; following Beddard's suggestion, he labelled it as *M. Rappii* [sic], and recorded it under this name in his paper (Rosa 1891). While doing this, Rosa ignored the other label inserted in the bottle, which is probably the original one made at the time when Rapp's material was deposited in the NHM, and on which presently can be read: '*Microchaetus microchaetus* Rapp Coll. Musei Vindobonensis Evertebr. Varia – Inv. No 4813.'

Following Rosa's identification, the species was recorded in the Inventory Book of the Natural History Museum under a number 5525. This entry reads: '*Microchaeta rappii* Beddard; Dr. Dan. Rosa in Turin determin. in 1891'. However, on the loose old record card kept in a separate box in NHM, the correction was not made, and it reads: '*Microchaetus microchaetus* Rapp, Inv. Nr. 4813, Fundort: Cap d. Gut. Hoffnung, A. N. 5525'.

It is noteworthy that the neighbouring acquisition Number A. N. 5524 existing in the Inventory Book of the NHM, is allocated to the specimen *Geoscolex maximus* Leuckart, 1841 from Brazil. Most likely it is the same specimen compared by Rapp to *Microchaetus microchaetus* at the time of its description. In the last section of Rapp's paper he states: 'Dieser Regenwurm [*M. microchaetus* – JDP] hat viel Aehnlichkeit mit *Geoscolex maximus*, Leuc. aus Brasilien'.

Beddard, when working on the Oligochaeta material of the Natural History Museum in Vienna, centred his study on material described by Schmarda (1861), or on unclassified specimens, and excluded *Microchaetus* material, not including it in his publication of 1892. In his monograph on the Oligochaeta (Beddard 1895), the name *Microchaeta rappi* was used, and a long discussion on priority of this name over *microchaetus* was provided, although no indication was given that the author had seen *microchaetus* type material. Michaelsen (1899) described *decipiens* and *braunsi*, indicating their close relationship to *microchaetus*. In his following papers, Michaelsen (1900 1910 1913a,b) accepted the priority of *microchaetus* before *rappi*, established it as the type of the genus *Microchaetus*. Consequently the species *rappi* (or *rappii* as it was spelled in the Beddard paper (1886b)) was synonymised with *microchaetus*. All attempts to clear the priority of *microchaetus* over *rappi* had led to the misleading conclusion that the two names refer to only one species. For many years a similar interpretation was followed: Stephenson (1930), Brinkhurst & Jamieson (1972), Pickford (1975), Reynolds (1976), and Jamieson (1988). Plisko (1991), adding the species *klopperi* and *stuckenbergi*, suggested that this group of six large species is a natural one.

#### *Microchaetus microchaetus* (Rapp, 1849)

*Lumbricus microchaetus* Rapp, 1849: 142.

*Microchaetus microchaetus* Rapp, 1849: 143.

*Anteus microchaetus*: Perrier, 1872: 49.

*Lumbricus microchaetus*: Perrier, 1881: 239; Reynolds, 1976: 136 [partim].  
*Microchaeta microchaetus*: Perrier, 1881: 239 [Invalid emendation of *Microchaetus*].  
*Lumbricus microchaeta*: Beddard, 1886a: 63 [Invalid emendation of *microchaetus*].  
*Microchaeta? microchaeta* [partim]: Vaillant, 1889: 185.  
*Antaeus microchaetus* [partim]: Vaillant, 1889: 185; Reynolds, 1976: 136 [Invalid emendation of *Anteus*].  
*Rappia? microchaeta* [partim]: Vaillant, 1889: 186; Reynolds, 1976: 60.  
*Microchaeta rappi* [non *Microchaetus rappi*, Beddard, 1886a,b]: Benham, 1886a,b.  
*Microchaeta Rappii* [non *Microchaetus rappi* Beddard, 1886a,b]: Rosa, 1891: 380.  
*Microchaeta rappi* [partim]: Horst, 1891: 77; Beddard, 1895: 669.  
*Microchaeta rappi* Benham, 1886 [c.f.] *Microchaeta rappi* Beddard, 1886 [partim]: Reynolds, 1976: 162.  
*Microchaetus microchaetus* (Rapp, 1849) [partim]: Michaelsen, 1900: 451.  
*Microchaetus microchaetus* [partim]: Brinkhurst & Jamieson, 1971: 739; Reynolds, 1976: 136; Plisko, 1991: 300; 1992: 340; 1998: 252.

Material examined (data derived from specimen label given in quotation marks):

'*Microchaetus microchaetus* Rapp, 1849; Cap d. Gut. Hoffnung; Coll. Musei Vindobonensis, evertabrata varia, Inv. No 4813, A.N. 5525'; well preserved, dissected type specimen (selected by Rapp from a group of specimens sent to him by Prof. Krauss), which I designate as lectotype. The whereabouts of the other specimens is unknown. Although I have not seen the specimens studied by Benham, the precise species description provided in his papers (1886a,b), allowed me to establish their identity as *microchaetus*. The location of this material is not presently known.

#### External characters:

*General*: Body cylindrical, slightly flattened in clitellar region. *Colour*: Preserved – yellowish-grey. *Dimensions*: 1800 mm long, preclitellarly 16 mm wide, in clitellar area 2 mm wider. *Segment number*: Exact number not established due to softened body; after repeated counting it was found to be about 792 segments. *Prostomium*: Prolobous, small. *Segmentation*: Secondary annulation present: 1 and 2 simple, short, with irregular longitudinal grooves; 3 with three annuli; 4–9 with 2 annulated ringlets, similar in size and appearance; clitellar segments longer than postclitellar, annulated; postclitellar short, randomly and irregularly annulated. *Setae*: Minute, closely paired; first pairs on 3. *Nephridial pores*: Obvious, below *c* setae; first pair in 2/3 intersegmental furrow. *Female pores*: On 14, small openings between *aa*. *Male pores*: Not seen. *Spermathecal pores*: Tiny openings in 4 intersegmental furrows: 12/13 = 2 + 3, 13/14 = 4 + 2, 14/15 = 5 + 4, 15/16 = 5+4.

Clitellar region: *Clitellum*: Indistinct, not noticed by Rapp during original description; saddle-shaped, brownish, terminated ventrally between *bc* setal lines; on 12–28, dorsally slightly stretched on 29. *Tubercula pubertatis*: At clitellar edges, brown, oblong ridges on 18–23, with little extension on 24.

#### Internal characters:

*Septa*: 4/5, 5/6, 7/8, 8/9 very much thickened, all similar in thickness and appearance; other septa thin. *Gizzard*: Large, muscular, in 7. *Calciferous glands*: In 9–10; muscular, communicating with oesophagus by a wide opening. *Intestine*: Commences in 13. *Typhlosole*: Due to very delicate, slightly decomposed state of intestine, position of typhlosole not established. *Dorsal blood vessel*: Doubled in 6, single in 7, doubled and separated in 8; in 9 cordiform. *Paired dorsoventral vessels*: Thin tubes gradually enlarging in 7–8, much enlarged in 9–11. *Nephridia*: One pair large meganephridia per segment; large tufts of coiled tubules, with oblong tube, and caeca.

Reproductive organs: *Spermiductal funnels*: Holandric arrangement; 2 pairs of funnels, iridescent, enclosed in sacs, each attached to posterior parts of segments 10 and 11 respectively. *Seminal vesicles*: Commencing at septa 10/11 and 11/12, extending to 11 and 12 respectively. *Spermathecae*: In 4 segments; small, spherical ampullae, with thin necks, different numbers per segment, close to septa: 12/13 = 2 + 3, 13/14 = 4 + 2, 14/15 = 5 + 4, 15/16 = 5 + 4. *Ovaries*: Medium-sized rosette in 13.

*Microchaetus rappi* Beddard, 1886

*Microchaeta rappi* Beddard, 1886a: 63 [Invalid emendation of *Microchaetus*].

*Microchaeta rappi* [partim]: Horst, 1891: 77; Beddard, 1895: 669.

*Microchaeta rappii* [invalid emendation or *rappi*]: Beddard, 1886b: 306; 1895 [partim]: 669; Coles, 1981: 276.

*Antaeus microchaetus* [partim]: Vaillant, 1889: 185; Reynolds, 1976: 136 [Invalid emendation of *Anteus*].

*Microchaeta? microchaeta* [partim]: Vaillant, 1889: 185 [Invalid emendation of *Microchaetus microchaetus*].

*Rappia? microchaeta* [partim]: Vaillant, 1889: 186; Reynolds, 1976: 60.

*Microchaetus microchaetus* (Rapp, 1849) [partim]: Michaelsen, 1900: 451.

*Microchaetus microchaetus* (Rapp, 1849) var. *typica* [partim]: Michaelsen, 1900; 1913a: 537.

*Microchaetus microchaetus* [partim] [lapsus calami]: Pickford, 1975: 26.

*Microchaetus microchaetus* [partim]: Brinkhurst & Jamieson, 1971: 739; Reynolds, 1976: 136; Plisko, 1991: 300; 1992: 340; 1998: 252.

Material examined (data derived from specimen labels given in quotation marks):

‘BMNH 1974.1.67–69 *Microchaeta rappi* Beddard, 1886; Type; Cape of Good Hope, don. Rev. G. [H. – JDP] R. Fisk’: large specimen in three pieces, dissected and decomposed; specimen was probably kept in water before dissection, as its intestine contains no soil; study of this poor material was difficult. This is probably one of the original specimens described by Beddard (1886a) as *M. rappi*, and can be accepted as the lectotype.

‘BMNH 1904.10.5.542; *Microchaeta rappii* [sic] Beddard, 1886, Grahamstown, Cape Province, South Africa, collected and donated to Beddard by Rev. [G. H. – JDP] R. Fisk. See Beddard item 14’. In this jar are also inserted other labels. One, ‘*Microchaeta rappi*’ corrected in Michaelsen’s handwriting to ‘*M. microchaetus*’. Second, ‘1974.1.67–69’ with a note: ‘Types’ [sic], which is probably a specimen transferred from a jar having the same number, when Michaelsen had classified it as ‘*microchaetus*’. Dissected over entire length, missing some internal parts, decomposed. Supposedly a specimen used by Beddard for the additional description in his second paper (1886b), as the name is spelled ‘*rappii*’, as in that paper.

‘*Microchaeta rappi* Beddard, 1886; BMNH 1974:1.91. Loc. ? Don. G. H. [R. –JDP] Rev. Fisk; paratypes’. Slightly decomposed, dissected, with missing internal organs in segments 9–25.

All specimens in these three jars, donated to Beddard by Rev. G. H. R. Fisk, labelled as ‘*M. rappi*’ or ‘*rappii*’ with numerous labels in various handwritings inserted in the jars, are without doubt the type material of *M. rappi* Beddard, 1886. Although the type locality for the lectotype can be specified only as the Cape of Good Hope, other material studied by Beddard was collected in the area of Grahamstown.

Due to poor condition of all specimens because of removal of internal organs from preclitellar segments, their examination was unsatisfactory. However, the position of

the clitellum extending over segments 11–31, and the presence of four rows of spermathecae (named in Beddard's papers as 'copulatory pouches') located near septa 12/13 13/14 14/15 15/16, clearly distinguish this species from *microchaetus* and the other species of this group. Although Beddard's (1886a,b) comprehensive description of *rappi* clearly distinguishes it from *microchaetus*, other data supplied later by Beddard (1895) include characters for both *rappi* and *microchaetus*.

#### DISCUSSION

As *M. microchaetus* was the first species, it established the genus *Microchaetus* and family Microchaetidae. At first with an unclear systematic position and only after some discussion, it was accepted as the type species for its genus. *M. microchaetus* is similar to five other species – *M. braunsi* Michaelsen, 1899, *M. decipiens* Michaelsen, 1899, *M. klopperi* Plisko, 1991, *M. rappi* Beddard, 1886 and *M. stuckenbergi* Plisko, 1991. They form a species-group characterised by: large body size (ca. 1 metre or more), consisting of over 500 segments; a long clitellum occupying more than ten segments; small, multiple spermathecae; meganephridia with V-shaped caeca; and a doubled dorsal blood vessel. Differences between these species are the number and position of spermathecae and position of the clitellum. Although in *braunsi*, *stuckenbergi* and *klopperi* the clitellum occurs similarly to *rappi* on segments 10–31,32, the number and position of spermathecae differs. In *decipiens* the clitellum is on 10–23 and the spermathecae in only three segments, being a clear distinction from all other species of the group. In *microchaetus* the clitellum extends over 12–28 and 1–4 spermathecae are in four rows near septa 12/13 13/14 14/15 15/16.

All species of this group penetrate deep into the soil and subsoil, have permanent burrows, and deposit large, hard casts on the surface.

The earliest records for *microchaetus* were stated broadly as 'vom Cap' or 'Cape of Good Hope'. Beddard (1884) for *rappi* repeated the name 'Cape of Good Hope', and indicated the area of Port Elizabeth to be source of collected specimens (1886a,b). Subsequently, discoveries of *braunsi*, *decipiens*, *klopperi* and *stuckenbergi* suggest that these species occur in a narrow area between Stutterheim (32°32'S:27°29'E) and Port Elizabeth (33°58'S:25°40'E), supporting the perception that they form a natural group within the genus (Plisko 1991).

Knowledge of the distribution of this group of very large species, however, is incomplete. Many other parts of the Eastern Cape Province have been poorly investigated. The described species may have a wider distribution than is presently known. Verbal reports have been received of large earthworm casts in the areas of Cradock, Jansenville and Graaff Reinet, suggesting the presence of members of this group, and possibly some undescribed species. One of them may prove to be *microchaetus* itself, thereby solving the mystery of the source of the specimen sent to Rapp.

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